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INSTITUTE OF GAS TECHNOLOGY

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GAS ABSTRACTS

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CONTENTS

1. Gas Industry 17
2. Appliances 18
3. Combustion and Industrial Furnaces 19
4. Carbonization and Gasification 21
5. Natural Gas and Natural Gas Condensates 23
6. Petroleum and Synthetic Liquid Fuels 27
7. Analytical Methods and Tests 30
8. General and Physical Chemistry 33
9. Organic Chemistry 35
10. Chemical Engineering 35
11. Process Equipment and Instrumentation 37
12. Materials of Construction 38
13. New Books 40

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1. GAS INDUSTRY

Fair Return

Badger, R.E. FAIR RETURN FOR NATURAL GAS COMPANIES. *Public Utilities Fortn.*, 12, 832-842 (1952) December 4.

Earlier Dr. Badger discussed the impact of the Northern Natural Gas Case and allied decisions of the Federal Power Commission on natural gas company financing. In this, the concluding installment, he goes into the question of determining the fair rate of return required for natural gas companies. He urges substitute measures for any attempt to gauge the cost of common stock capital in a growing industry by "spot" earnings-price ratios.

Author's Abstract

Future Gas Growth

Egloff, G. NATURAL GAS GROWTH PREDICTED. *Am. Gas Assoc. Monthly*, 34, 11, 12, 45, 46 (1952) December.

There will be ample supply of natural gas to fulfill all industrial as well as domestic needs. Production of natural gas will be 15 trillion cu. ft. in 1975; largest future markets for natural gas will be in space heating and industrial uses.

D. C. Gami

Gas Research

Pettyjohn, E. S. FACILITIES OF INSTITUTE OF GAS TECHNOLOGY AVAILABLE TO CANADIAN GAS INDUSTRY. *Can. Gas J.*, 45, 279-281 (1952) November.

This article consists of the address delivered by the Institute's director to the 45th Annual Convention, Canadian Gas Association. It summarizes IGT's organization, objectives, facilities and operation, and solicits participation by Canadian gas companies in its activities.

A. E. Neumann

Industrial Gas Load

Pardoe, T. H. ASPECTS OF INDUSTRIAL GAS APPLICATION. *Gas J.* (British) 272, 506-511, 521 (1952) November 26.

This paper presented October 8 to the South Western Section of the Institution of Gas Engineers at Taunton reviews the location and types of industry in the south west; gas consumption and steps to be taken to meet load losses where they occur; some interesting industrial installations within the area; and the organisation of the area industrial gas office. A list of industries in the various subdivisions indicated that the area is not exclusively concerned with holidays and relaxation, but there is no danger that the area will become industrialised in the sense that some other areas are.

Author's Abstract

Pyper, F. G. SELECTION OF PLANT AND ITS RELATION TO THE BULK ACCEPTANCE OF COKE OVEN GAS. *Gas World* (British) 136, 1296-1301 (1952) November 22; *Gas J.* (British) 273, 685-6, 689-90, 697 (1952) December 17.

The heavy industrial gas load from Monday to Friday, with a 50% drop over the week-end, has required careful manipulation of the 82 interconnected storage holders and the coke-oven, coal gas and water gas plants. Minimum base-load (summer) gas must not exceed the oven-gas purchased plus the coal gas from plants on coal-gas underfiring (about 57 MMCF/day for the 452 MMCF week). This requires replacement of some coke-oven gas now purchased by gas from gas-works carbonizing plants provided with alternative coal gas/producer gas underfiring, so that the 62 MMCF/day minimum can be met in the winter's maximum week of 588 MMCF. New plants and holders, their location, water gas usage, main and compression costs, leakage and coke markets are extensively discussed in meeting this problem of flexible supply.

O. P. Brysch

Oil Politics

Duff, D. M. LATIN AMERICA OIL THREAT DEVELOPS. *Oil Gas J.*, 51, 83, 84 (1952) December 8.

Recent political developments threaten the stability of the two billion dollar petroleum industry in Venezuela, the world's largest oil exporter. An increase in taxation seems likely and this may price Venezuelan oil out of world markets.

J. D. Parent

Pipe Line

Perkins, C. L. THE EL PASO STORY. *World Oil*, 135, 239-246 (1952) November.

The El Paso Natural Gas Co. has built 6080 miles of pipeline to deliver 1,200,000,000 CF/D. Difficulties encountered when constructing the pipeline are discussed. D. C. Gami

Price and Supply

Thompson, E. I. SUPPLY OF GAS LINKED TO PRICE. *Am. Gas Assoc. Monthly*, 34, 25, 52, 53 (1952) December.

The author, speaking for producers and royalty owners, states that the wellhead price of natural gas must be sufficiently high to encourage continued heavy investment in exploration and new wells. A. E. Neumann

Texas Commission Rules

Carlson, R. F. DRILLING AND PRODUCING REGULATIONS. *Oil Gas J.*, 51, 9-109 (1952) November 24.

The Texas Railroad Commission exerts control in every phase of oil production. The agency's rules and application forms are presented concisely. J. D. Parent

2. APPLIANCES

Appliance Sales

Ruthenburg, L. WHENCE, WHITHER, AND HOW. *Am. Gas Assoc. Monthly*, 34, 19, 46, 47 (1952) December; *Gas Heat* 3, 28-29 (1952) November.

The problem of improving sales of gas appliances in the presence of electric appliance competition is discussed. E. F. Searight

Burner Design

Conta, L. D. and Teti, J. (assigned to Air Reduction Co.) FLASHBACK-PROOF GAS MIXER. U. S. 2,618,539 (1952) November 18.

A flashback-proof gas mixer is described, which consists of closely-spaced heavy packing plates in a thick-walled mixing chamber. The plates, normal to the separate entering gas and air streams, produce a baffling effect to cause mixing, and have sufficient heat absorbing capacity to cool and prevent burned gases from flashing back. E. F. Searight

Whittington, J. A. GAS BURNER MULTIPLE PRIMARY AIR INLETS. U. S. 2, 615,509 (1952) October 28.

A gas burner with multiple primary air inlets is described, in which the fuel gas is jetted through successively enlarged aligned orifices in plates, these forming the separating walls of the inlets which are fed from an annular air chamber. The last orifice communicates with a neck leading to the burner head.
E. F. Searight

Flue Gas Corrosion

Myler, W. M., Jr. STUDY GAS COMBUSTION CORROSION. *Am. Gas Assoc. Monthly*, 34, 17-18 (1952) November.

Results of the AGA project DGR-CH Reports No. 1 and 2, by Battelle Memorial Institute are reviewed. These pertain to the corrosion behaviour of mild steel, the commonly used appliance material, and a number of other metals and coated materials, under conditions resembling closely those which occur in gas appliances. Two values, the average penetration rate and the maximum penetration rate (in mils/year) and their ratio, are used to compare and estimate the structural life and the life until perforation of the various materials. E. F. Searight

Range Burner

Prather, G. P. (assigned to J. A. Grier) GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY. U.S. 2,617,404 (1952) November 11.

A gas range using premix radiant burners is described. Air under pressure is supplied by a motor-driven blower to an air-manifold which feeds all burners. Gas is supplied from a usual manifold through a gas-cock for each burner, the extended shaft of this cock also actuating a butterfly-valve in the particular air-manifold branch to provide the proper proportion of air, and in addition closing the blower switch and the electric igniter switch.
E. F. Searight

Harper, P. S. and Peterson, V. C. (assigned to Harris Trust & Savings Bank) GAS FUELED

SIMMER BURNER WITH FLAME RETAINING PORTS. U. S. 2,619,164 (1952) November 25.

A simmer burner is described, which forms the central part of a double burner unit, each part supported on its own mixer-tube with its own gas supply. The burner cap is radially slotted to provide circumferential ports, and also is slotted peripherally to provide a continuous ribbon of flame between ports, these slots being so dimensioned as ensure a stable, noiseless flame. E. F. Searight

3. COMBUSTION AND INDUSTRIAL FURNACES

Anti-Flash Burner

Teti, J. (assigned to Air Reduction Co.) GAS MIXER. U. S. 2,618,540 (1952) November 18.

A mixer for oxyacetylene gas-burning apparatus is described, in which the separate entering gas streams pass through porous blocks before reaching the mixing chamber and burner. The fine pores of the blocks prevent flashback from the burner, by deactivation of the active products of combustion. E. F. Searight

Combustion Safeguards

Price, J. COMBUSTION SAFEGUARD EQUIPMENT. *Industrial Gas* (British), **16**, 56-60 (1952) November.

Three arrangements employing thermoelectric devices for safeguard for gas rates over 750 cu. ft./hr. are described. E. F. Searight

Engine-Knock Flame

Levedahl, W. J. and Broida, H. P. EMISSION SPECTRA ON AUTOIGNITED HEPTANE-AIR MIXTURES. *Anal. Chem.*, **24**, 1776-1780 (1952) November.

The explosive knock reaction in internal combustion engines is known to be caused by multistage autoignition, although its mechanism has not been satisfactorily explained. An apparatus was developed to obtain emission spectra on the cool-flame and hot-flame stages of autoignition in an internal combustion engine and to record total emission intensity as a function of time during the combustion cycle. Spectra of the cool-flame stage of n-heptane autoignition were identical to those of formaldehyde fluorescence. Hot flame reactions showed CH and OH under all operating conditions, while C_2 bands appeared in rich mixtures. Hydrocarbon flame bands were observed in lean mixtures. Cool-flame intensity rose rapidly to a peak, then decreased sharply before the onset of the much more intense hot flame. It is indicated that the entire cool-flame emission is caused by excited formaldehyde. The decrease in cool-flame intensity prior to the initiation of hot flames shows that the rate of formation of excited formaldehyde reaches a maximum and subsequently decreases before the onset of the hot flame. The technique of oscillographically recording the intensity of filtered radiation detected by a photomultiplier tube is extremely useful because of its simplicity, sensitivity, and reliability. A medium-size spectrograph was found to be successful in identifying a number of well-known emitters. Authors' Abstract

Flue Gas Corrosion

Corbett, P. F., Flint, D., and Littlejohn, R. F. DEVELOPMENTS IN THE B.C.U.R.A. DEW-POINT METER, FOR THE MEASUREMENT OF THE RATE OF ACID BUILD-UP ON COOLED SURFACES EXPOSED TO FLUE GASES. *J. Inst. Fuel* (British), **25**, 246-252 (1952) November.

Further work, both in the field and in the laboratory, has led to substantial development in the design of the B.C.U.R.A. dew-point meter and in the interpretation of the results obtained with it. During early field tests a survey was made of the dew-point characteristics of 18 different boiler installations. Dew-point temperatures (due to condensed sulphuric acid) of 270° F. and upwards were recorded on all stoker-fired plants, and the rate at which the acid condensed on the dew-point element varied considerably from one boiler to another. The main conclusion reached from these preliminary observations is that this "rate of build-up" is an important factor in assessing the potentially corrosive nature of flue gases. A new type of dew-point meter element was designed and laboratory and field tests were made to aid in the interpretation of observations.

Authors' Abstract

Thurlow, G. G. AN AIR-COOLED METAL PROBE FOR THE INVESTIGATION OF THE CORROSIVE NATURE OF BOILER FLUE GASES. *J. Institute Fuel* (British), **25**, 252-260 (1952) November.

A temperature-controlled metal probe has been designed and used in several different boiler flue gases in a study of corrosion phenomena. The results obtained indicate that there is a general relationship between the weight of acid condensed and the quantity of iron corroded, and also that a peak occurs in the rate of corrosion some 50° to 100°F. below the acid dew-point. These findings are in general agreement with other results obtained in both laboratory and field investigations using the B.C.U.R.A. dew-point with other results obtained in both laboratory and field investigations using the B.C.U.R.A. dew-point meter and chemical method of SO_3 determination.

Author's Abstract

Flue Gas Venting

Reiter, F. M. HOW TO SOLVE PROBLEMS OF VENTING WITH GAS-FIRED INDUSTRIAL EQUIPMENT. *Industrial Gas*, **31**, 3-5, 27, 28 (1952) August; 10-12, 26-28 (1952) September.

Desirability of venting, its fundamentals in practical applications, normal sizes of flues and chimneys, and the use of multiple parallel horizontal flues, chimney dimensions, draft diverters or hoods, condensation of moisture in stacks, corrosion problems are reviewed generally.

Author's Abstract

Gas-Engine Power

Lay, R. F. IS GAS-ENGINE POWER GENERATION ECONOMICAL? *Gas*, **28**, 40-43 (1952) November.

An economic study of the use of gas engines for power generation indicates that continued development in the efficiency, dependability and cost reduction of gas engines now makes gas engines competitive with other power generating methods.

E. J. Pyrcioch

Gas Turbines

Davy, C. H. and Webb, T. B. (assigned to The Babcock & Wilcox Co.) GAS TURBINE PLANT USING SOLID ASH-CONTAINING FUEL. U. S. 2,616,256 (1952) November 4.

The patent relates to a pressure and high-temperature reactor for burning granulated ash-containing fuel to supply a motive gas for gas turbines.

E. J. Pyrcioch

GAS TURBINES. *Power*, **96**, 79-110 (1952) December.

This comprehensive report on gas turbines covers current practice in equipment, material and plant layouts. Developments in stationary units are emphasized. A brief review of gas-turbine principles and performance precedes the report to form a basis for evaluation of developments. A tabulation of engineering features of world-wide gas turbine installations is included.

E. J. Pyrcioch

Oil-Ash Damage

Jones, M. C. and Hardy, R. L. PETROLEUM ASH COMPONENTS AND THEIR EFFECT ON REFRACTORIES. *Ind. Eng. Chem.*, **44**, 615-2641 (1952) November.

The study of the reactivity of petroleum ash components on refractories used in industrial furnaces indicated that petroleum ashes containing vanadium are very destructive to fireclay brick. The alkali metals, particularly sodium are not as destructive but do lower the fusion points of refractories. An analysis of 25 different crudes for ash components showed that most crudes contain ash which is destructive to refractories. Damage can be controlled by eliminating direct flame impingement, cooling the refractory and by the use of refractory brick that is resistant to attack by ash components.

E. J. Pyrcioch

Ore Reduction

DeVaney, F. D. MAGNETIC ROASTING OF LEAN ORES. *Mining Eng.* **4**, (AIME Trans) 1219-1223 (1952) December.

Experimental roasting of lean (29.6% Fe) taconite iron ores at the Hibbing, Minn. laboratory of the Erie Mining Co. shows that 43.77% of the roasted ore can be recovered as a magnetic concentrate containing 63.25% Fe. This is achieved by passing a weak reducing gas (5% CO, 15% CO_2) at 1500° to 1600° F. through a

descending bed of 3/8-in to 10-mesh ore in a furnace containing superimposed cooling, preheating and reducing zones. Heat is added to the recirculating gas stream by controlled combustion of oil in a side-chamber.

O. P. Brysch

Power Plant Fuel

Frick, C. H. SELLING COAL FOR POWER. *Coal Age*, 57, 71-75 (1952) November.

The plan for coal purchases used by the Pennsylvania Power and Light Co. is discussed, with suggested applications to the electric power industry. Cost per million Btu in steam produced is determined by trial as a basis for a particular plant, and factors of consistent quality, supply, handling and price of other coals are compared. Contracts and selling approach are treated. O. P. Brysch

4. CARBONIZATION AND GASIFICATION

Benzene Refining

Anderson, J. R. (assigned to Koppers Co.) PURIFICATION OF DISTILLED COKE OVEN BENZENE BY DISTILLATION WITH ADDED HYDROCARBON MATERIAL. U. S. 2,618,591 (1952) November 18.

Coke-oven benzene is purified by a 2-stage azeotropic distillation, the first stage removing impurities as bottoms and yielding a cyclohexane-benzene azeotrope as overhead. The latter is fed to the second stage with addition of methanol. The methanol-cyclohexane azeotrope is removed as overhead, while the pure benzene is removed as bottoms. The latter azeotrope becomes substantially immiscible at room temperature and each phase is purified in a separate column, to recover the pure components for recycling. O. P. Brysch

Stiles, A. B. (assigned to E. I. du Pont de Nemours & Co.) METHOD OF CATALYTICALLY REMOVING SULFUR. U. S. 2,620,362 (1952) December 2.

Thiophene and other sulfur compounds are removed from aromatic hydrocarbons by vapor-phase catalytic treatment with a supported and sulfided metal salt of an amphoteric metal of the V or VI groups of the periodic table, more specifically a vanadate, chromate, molybdate, or tungstate of such metals as the alkaline earths, silver, and the metals of the iron group. Desulfurization of benzene or other aromatic hydrocarbons is carried out by passing the hydrocarbon gases, mixed with 10 to 30% by volume of hydrogen, over the catalyst at temperature preferably between 325° and 375° C. at a space velocity preferably between 300 and 800 per hour. Under these conditions a benzene highly contaminated with thiophene can be purified to less than 1 p.p.m. of sulfur.

D. M. Mason

Coal Gasification

Fischer, H. G. and Welty, A. B., Jr. (assigned to Standard Oil Development Co.) GASIFICATION OF CARBONACEOUS MATERIALS. U. S. 2,618,544 (1952) November 18.

A method of gasification of carbonaceous materials with steam is described wherein the main reaction takes place in the fluidized bed reactor. The heat for the reaction is furnished by the combustion of the carbonaceous material with air in another part of the reactor by using a very short contact time for this reaction and thereby obtaining the maximum of exothermic heat to be used for the carbon-steam reaction.

S. Mori

Traenckner, K. GAS AUS NICHT-VERKOKUNGS-WUERDIGEN KOHLEN. (GAS FROM NON-COKING COALS.) *Gas-u Wasserfach* (German), 93, 537-547 (1952) October.

Three of the more promising methods of gasifying non-coking coals which are under development are: (1) conversion of powdered fuel suspended in air for the production of a low heating-value gas (vortex gasifier and pulsatory gasifier). (2) gasification in a fixed bed under pressure using oxygen and steam. (Lurgi Process). (3) gasification of fuel in small particle sizes by heat transfer from contact with a solid heat-carrying medium (Koppers Co. and Weber Processes). Gasification of powdered fuels by the pulsatory technique involves intermittent admission of fuel-air mixtures into an outwardly tapered tube, causing combustion waves which follow approximately the laws for vibrating air columns. Extremely high heat transfer rates are possible, of the order of 4 million Btu/hr cft. C. von Fredersdorff

Coal Petrography

Stach, E. DIE VITRIT-DURIT-MISCHUNGEN IN DER PETROGRAPHISCHEN KOHLENANALYSE. (VITRIT-DURIT MIXTURES IN PETROGRAPHIC COAL ANALYSIS.) *Brennstoff-Chemie*, 33, 361-370 (1952) November 19.

Analysis of vitrit-durit mixtures has been improved by the application of the contrast microscope and the powder relief section. Semimatte coal layers are found to consist of such mixtures. Microspores always occur with fine grained micrinit in massive opaque matter. Maceral anlyses of vitrinit-exinit-inertinit mixtures is discussed, with review of other workers' recent results. O. P. Brysch

Coal Reactivity

Donnelly, R. P., Broadbent, R. and O'Leary, B. J. INFLUENCE OF IRON OXIDE ON THE REACTIVITY OF LOW RANK COALS FROM COLLIE, WESTERN AUSTRALIA. *Fuel* (British) 31, 418-428 (1952) October.

The authors conclude that the reactivity of chars prepared by carbonization of sub-bituminous coals is rather low at 950° C. Iron oxide when added to the coal substance catalyzes the reaction $CO_2 + C = 2CO$ whereas normal iron oxide contained in the ash did not exhibit this effect. C. von Fredersdorff

Gas-Oven Development

Lorenzen, G. DIE ENTWICKLUNG DER GASWERKOFEN. (THE DEVELOPMENT OF GASWORKS OVENS). *Gas-u Wasserfach*, 93, 613-622 November 1; 668-671 (1952) December 1.

The history of the development of gasworks ovens is given, beginning with the laboratory and practical studies of coal distillation by Jan Pieter Minckelers in Maastricht in 1785. Beehive, retort ovens and varieties of chamber ovens are described and illustrated. The pioneer inventors' and engineers' contributions to the gas industry are outlined. The concluding section deals with the perfection of several present-day gas ovens. Condensed descriptions and assembly drawings are given for continuous and semi-continuous (cooling chamber) verticals, and of water gas production by steaming, as well as combination underfiring. All types are compared by a table showing through-put and fuel economy. A bibliography of 45 basic references is given. O. P. Brysch

HCN Recovery

Cain, G. A. and Chatelain, J. B. (assigned to Freeport Sulphur Co.) PRODUCTION OF SODIUM CYANIDE. U. S. 2,616,782 (1952) November 4.

An improved method is presented for producing substantially pure sodium cyanide, utilizing the hydrogen cyanide content of coke-oven gas or hydrogen cyanide produced by the catalytic reaction of hydrocarbons, air, and nitrogen-containing compounds. C. E. Hummel

Iron Carbonyl

Gooderham, W. J. and Mills, F. E. SOME EFFECTS OF TRACES OF IRON CARBONYL IN TOWN GAS. *Gas World* (British) 136, 1359 (1952) November 29; 1630-1632, December 27; *Gas Times* (British) 73, 378 (1952) December 12; Gas J., 273, 55 (1953) January.

Gas which had remained in a main for a long time before use was found to contain a large amount of iron carbonyl. Upon combustion, the gas produced sooty deposits which hampered utilization in appliances. The addition of sulfur dioxide to the gas main with purging remedied the situation. C. E. Hummel

Italian Coke

IL PIANO SCHUMAN E LE COKERIE ITALIANE. (THE SCHUMAN PLAN AND ITALIAN COKE PLANTS). *Rivista dei Combustibili*, 6, 575-578 (1952) September.

Because the Italian coking plants always import the coal from extremely distant sources, the coke offered to the industries must be sold at higher prices than proposed under the Schuman Plan, with its unification of prices. Hence, these coke plants (4 metallurgical and 6 chemical) are concerned, and face a catastrophe unless the Government imposes a customs tax on coke coming into the country under that plan.

S. Sensi

Low-Ash Coal

Wesner, A. L. and Richardson, A. C. THE PREPARATION OF LOW-ASH COAL. *Mining Eng.*, 4, 1059-1061 (1952) November.

Preliminary laboratory and final pilot continuous washing tests are described, in which

Eagle Seam coal of 3.79% ash content was used. Using a heavy-medium type separator with 1.27 sp.gr. calcium chloride solution and wetting agent, a yield of 66.4% was obtained as float coal with 0.92% ash content.

O. P. Brysch

Methane Production

Alberts, L. W., Bardin, J. S., Beery, D. W., Jones, H. R., and Vidt., E. J. PRODUCTION OF METHANE FROM COAL. *Chem. Eng. Progress*, 48, 486-493 (1952) October.

The production of 915 Btu., 0.57 sp.gr., pipeline gas from coal by the catalytic methanization of synthesis gas produced from coal is estimated to cost 55.4 cents per MCF final gas, requiring an estimated initial investment cost of 52.5 million dollars with amortization over a period of 12 years. The synthesis gas production cost is based on the use of a non-coking coal in 12-ft. I.D. Lurgi pressure generators, followed by initial purification by the Rectisol process, methanization with nickel catalyst, final purification and compression to 1200 psig.

C. von Fredersdorff

Peak Shaving Facilities

White, B. C. STANDBY AND PEAK SHAVING PROJECT. *Petroleum Eng.*, 24, D50-D57 (1952) December.

A description of high-pressure storage and mixing facilities with a total gas capacity of 100 MMCF is presented for a stand-by and peak shaving plant operating near Rockville, Md.

H. A. Dirksen

Plant and Load

Burns, J. and Clark, L. J. EFFECT OF LOAD VARIATION ON COSTS. *Gas World*, (British) 136, 1362-1369 (1952) November 29; *Gas Times* (British) 73, 298-300 (1952) November 28; *Gas J.* (British) 272, 611-612, 624, 629-30, 635 (1952) December 10.

Selection of a suitable and economic gas production plant to meet new loads is considered. The requirements and costs of a new plant are compared with existing facilities. To analyze the effects of cold spells on the gas supply to consumers, their frequency and duration for the last 23 years are examined. R. A. Brown

Synthesis Gas

Mayland, B. J. (assigned to Phillips Petroleum Co.) PRODUCTION OF CARBON MONOXIDE AND HYDROGEN SYNTHESIS GAS. U. S. 2,618,543 (1952) November 18.

In the production of carbon monoxide and hydrogen by the partial oxidation of light hydrocarbon (natural gas), the patent claims an increase in reaction products is achieved by subjecting the gaseous products to a steam-carbon slurry to promote the water-gas-shift reaction.

H. A. Dirksen

Mayland, B. J. (assigned to Phillips Petroleum Co.) PRODUCTION OF HYDROGEN AND CARBON MONOXIDE SYNTHESIS GAS. U. S. 2,618,611 (1952) November 18.

A process is described where a synthesis gas with a ratio of less than 2:1 hydrogen to carbon monoxide is passed over a shift catalyst in the presence of small quantities of oxygen at temperatures between 900°F.-1200°F. to give an improved ratio of hydrogen to carbon monoxide, usually above two. H. A. Dirksen

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Carbon Black Processes

Bills, J. L. and McKinnis, A. C. (assigned to Union Oil Company) MANUFACTURE OF CARBON BLACK. U.S. 2,618,533 (1952) November 18.

It is claimed that by passing a combustible gas mixture through a porous diaphragm prior to combustion, very fine-grained carbon black (average size 10 millimicrons) could be produced by using a conventional process. D. C. Gami

Fross, A. E. (assigned to International Carbon-Black Corp. Ltd.) APPARATUS FOR EXPLOSIVE CONVERSION OF HYDROCARBON GASES TO CARBON BLACK. U. S. 2,619,410 (1952) November 25.

This invention relates to on apparatus for the production of carbon black from natural gas by explosive oxidation in small (approximately one-liter) combustion chambers. A large surface is provided within the combustion chambers.

O. T. Bloomer

Krejci, J. C. (assigned to Phillips Petroleum Company) CARBON BLACK PROCESS. U. S. 2,616,794 (1952) November 4.

A process for making soft, intermediate and hard carbon blacks is described. A mixture of fuel such as natural gas and air is introduced through tangential burners at sufficient velocity to cause the flame to adhere to the inside surface of the chamber and form a blanket of flame and products of combustion over the chamber wall throughout its length. D. C. Gami

Krejci, J. C. (assigned to Phillips Petroleum Co.) PROCESS FOR PRODUCING CARBON BLACK. U. S. 2,616,795 (1952) November 4.

An apparatus for making carbon black as hard as or harder than channel black is described. The reactor system consists of three sections: First, a combustion zone—where hydrocarbon is brought to required temperature; second, reaction zone; and third, outlet zone. Hydrocarbon is introduced axially, while air is introduced tangentially at high velocity so that it remains adjacent to the cylinder wall by centrifugal force. D. C. Gami

NEW BLACK PROCESS. *Oil Gas J.*, **51**, 72-73 (1952) November 24.

A new low-investment cost, very high yield carbon black process as described. Yields as high as 16 lbs. of black per MCF are claimed. Nothing is told as to quality of the black.

J. D. Parent

Communications

King, R. T. BETTER COMMUNICATIONS FOR UTILITIES. *Public Utilities Fortn.*, **50**, 780-788 (1952) November 20.

A brief history of the growth of utilities during the past century, discussion of the resultant increasing need for rapid communication between nearby as well as distant points, and steps taken by the commercial telephone companies to fill this need with facilities ranging from simple wire circuits to microwave.

A. E. Neumann

Dehydration

Boyd, L. DESIGN AND OPERATION OF DEHYDRATORS FOR VOLATILE HYDROCARBONS. *Oil Gas J.*, **51**, 106-109 (1952) December 8.

A closed-system dehydrator for drying volatile hydrocarbon liquids is described. The unit employs a solid desiccant and uses heated recirculated vapors of the volatile hydrocarbon as the desorption medium. A considerable saving of this recirculating system over the non-circulating system is claimed. O. T. Bloomer

Campbell, J. M., Skinner, W., Jr. and Laurence, L. DEHYDRATION OF NATURAL GAS AND LIGHT HYDROCARBON LIQUIDS. *Petroleum Refiner*, **31**, 106-112 (1952) October.

An excellent and rather complete treatment on the drying of gas by dry desiccants is given. Major topics discussed include properties of desiccants, effects of operating variables, and contaminants on desiccants, regeneration, factors in equipment design, and economic considerations. O. T. Bloomer

Hetherington, C. R. OAKFORD PROJECT DEHYDRATION PLANT USES SINGLE-BED SPLIT-FLOW TOWER DESIGN. *Oil Gas J.*, **51**, 96-99, 119-120 (1952) November 10.

A solid-adsorbent type dehydration plant to dry the gas to a dew point of 0°F. at pipe-line pressure is described. By utilizing split-flow design the breaking-up and dusting of desiccant is eliminated. D. C. Gami

Gas Release

Kennedy, H. T., and Olson, C. R. BUBBLE FORMATION IN SUPERSATURATED HYDROCARBON MIXTURES. *J. Petroleum Techn.*, **4**, 271-278 (1952) November.

Observations are reported on the formation of gas bubbles from supersaturated solutions of methane in kerosine in the presence of silica and calcite crystals. Bubbles formed on the crystal-hydrocarbon interface in preference to the body of the liquid. The rate of bubble formation was a function of the supersaturation only. Supersaturation was observed up to 770 psi. At 30 psi supersaturation and lower no bubbles were observed to form in 138 hours of observation. Silica and calcite crystals had identical effects. O. T. Bloomer

Gas Reserves

Cornell, D. HOW YOU CAN COMPUTE GAS RESERVES MORE ACCURATELY. *World Oil* **135**, 220-226 (1952) December.

Charts for predicting data in 24-hour and three-

day shut-in pressures for natural gas will have been prepared. These charts are used to compute the equivalent reservoir pressure and gas reserves from a single pressure measurement.

D. C. Gami

Gas Separator

Hayes, C. W. and Martin, V. G. (assigned to Black, Sivalls & Bryson, Inc.) GAS AND LIQUID SEPARATING APPARATUS. U. S. 2,619,187 (1952) November 25.

An apparatus for separating water, oil and gas from a fluid mixture such as the flow from petroleum producing wells is described. This apparatus is designed for use in cold climates without the danger of freeze-ups. It has separate heating and settling sections and a readily adjustable water siphon for drawing off the separated water.

I. P. Patel

Gas Well Spacing

Cornell, D. HOW TO DETERMINE GAS WELL INTERFERENCE GRAPHICALLY. *World Oil*, 135, 187-188 (1952) November.

A graphical solution of the unsteady-state flow formulas for radial laminar flow has been constructed for the constant production-rate case starting with a uniform procession throughout the reservoir. The chart is of use in calculating the extent of interferences of one gas well with another and in determining gas well spacing. Abstracters note: The restriction placed on this chart by the assumption of laminar flow should have been emphasized. This assumption would be nearly correct except in the immediate activity of the well bore. This will have a negligible effect on the interference or gas-well spacing problem presented here but would invalidate the use of this chart for one of the possible applications, namely to estimate bottom-hole pressures in flowing wells from the known shut-in pressure.

O. T. Bloomer

H_2S Removal

HYDROGEN SULPHIDE REMOVAL BY POTASSIUM PHOSPHATE SOLUTION. *Petroleum Eng.*, 24, E-29 (1925) November.

A chart for rapid computation of the amount of potash or phosphoric acid necessary to replenish the regenerated phosphate solutions is presented.

D. M. Mason

Improved Transmission

Love, F. H. COMPRESSION AND DEHYDRATION. *Petroleum Eng.*, 24, D24, D28, D30 - D39, (1952) November.

United Gas Pipe Line Co. has doubled its capacity by building eight new compressor stations. All the compressor units are of angle type and are driven by 2- or 4-cycle engines. The dehydration plants are of the solid desiccant type.

I. P. Patel

LP-Gas Recovery

Campbell, J. M. and Maddox, R. N. PROCESSING AND RECOVERY OF LIGHT HYDROCARBONS IN THE FIELD. *Oil Gas J.*, 51, 122-125 (1952) December 1.

Investigations show that revenue from a given lease may be substantially improved by application of new processing methods like glycol injection or low temperature separation. The investigations also show that stabilization is indicated in virtually all cases where low temperature separation is advisable.

I. P. Patel

Load Factor

Wigglesworth, G. L., Jr. LOAD FACTOR OF PIPE LINES. *Heating, Piping and Air Conditioning*, 24, 83-85 (1952) November.

The variable demands on a distribution system can be accurately predicted and met as in this case of a small utility by the use of peak day-load curves and standby equipment.

R. A. Brown

Peace River Reserve

Rowland, L. O. LARGEST CANADIAN GAS RESERVE TO DATE IS DEVELOPING. *Petroleum Eng.*, 24, B55-B68 (1952) December.

Of great significance to the Pacific Northwest is the fact that what will probably become the largest natural gas reserve in Canada has been proved in the Peace River area of northeastern British Columbia recently. All of this gas is available immediately for export. The potential market is upwards of 300 MMCF/day.

J. D. Parent

Link, T. A. WHAT DOES PEACE RIVER MEAN TO WESTERN CANADA? *World Oil*, 135, 298-306 (1952) December.

The geology of the Peace River area of Western Alberta and Eastern British Columbia is briefly

reviewed. This area is very favorable for gas accumulation. Approximately 2 trillion cu. ft. of gas reserves have already been discovered and by drilling of a relatively small number of wells. The author estimates that reserves in this area may be 25 to 50 trillion cu. ft. or even more. O. T. Bloomer

Pipeline Design

Geilenkeuser, H. DER EINBAU VON DEHNUNGSAUSGLEICHERN IN ERDVERLEGTE, VERSCHWEISSTE ROHRLEITUNGEN (THE BUILDING-IN OF EXPANSION COMPENSATORS IN BURIED WELDED TRANSMISSION PIPES) *Gas- und Wasserfach*, **93**, 657-660 (1952) December 1.

The research of the Ruhrgas A.G. upon influence of expansion in the design of transmission piping is briefly reviewed. Experience with the origin and degree of strain in pipes is cited from the standpoint of temperature and pressure fluctuations, earth movements and line construction. Permissible requirements for safety in design are discussed (a) for the theoretical case of lines without joint-sleeves and (b) lines with cylindrical and spherical joints. The reduction of strain by compensators and effects of type of joint, earth friction and pipe coatings are discussed with examples, and formulas are given to determine the necessity for and spacing of compensators. O. P. Brysch

Van Den Hende, M.A. RESOLUTION GRAPHIQUE DES PROBLÈMES DE PERTE DE CHARGE DANS LES CANALISATIONS. (GRAPHICAL SOLUTION OF THE PROBLEM OF PRESSURE LOSS IN PIPE LINES). *Revue générale Gaz* (Belgian) **74**, 211-223 (1952) September-October.

Graphical solutions for the general flow equation are offered in terms of three variables: flow rate, pressure differential and up-stream or downstream pressure. A large number of examples is furnished. J. D. Parent

Power Fuel

Murphy, E. HOW NATURAL GAS HELPS ADD CAPACITY OF 160,000,000 lbs. OF ALUMINUM. *Gas Age*, **110**, 21, 74-76 (1952) October 9.

New San Patricio aluminum reduction plant of Reynolds Metals Co. has all energy requirements supplied by natural gas, with total consumption of 45,000 Mcf daily; natural gas engines produce 240,000 h.p.

Author's Abstract

Production

Conrad, M. B. (assigned to Baker Oil Tools Inc.) GAS PRESSURE OPERATED WELL APPARATUS. U. S. 2,618,343 (1952) November 18.

This invention relates to an improved well packer. The packer is set in the tubing by combustion gases from a self-contained flame and is designed so that certain operating sequences are performed in a predetermined order as the pressure from the combustion gases increases. O. T. Bloomer

Spencer, J. R. and Boyd, W. L. NEW METHOD FOR DIRECT DETERMINATION OF BOTTOM-HOLE PRESSURES. *Oil Gas J.*, **51**, 122 (1952) November 10.

A chart is presented for direct determination of bottom hole pressure. Variables are specific gravity of the wellstream, shut-in tubing pressure and depth. The basis of the chart is not explained, and its accuracy compared to measured values or values computed by accepted methods is not given. J. D. Parent

Properties of Propane

Seifarth, J. H. and Joffe, J. ISOBARIC HEAT CAPACITY OF PROPANE. *Ind. Eng. Chem.*, **44**, 2894-2897 (1952) December.

The author provides a plot of the specific heat deviation from the ideal gaseous state of propane as a function of temperature (200-1300° F.) for isobars ranging from 100 to 10,000 psia. The equation used in calculation was derived by Sledjeski from the Benedict-Webb-Rubin equation of state. I. P. Patel

Purification

McClendon, E. A. (assigned to Phillips Petroleum Co.) PORTABLE AMINE GAS TREATER. U.S. 2,616,513 (1952) November 4.

An apparatus is described for treatment of small volumes of natural gas for removal of acidic constituents such as hydrogen sulfide and carbon dioxide, and for regeneration of the alkanolamine absorbent. The apparatus

may also be used for dehydration of gases by using a liquid dessicant such as ethylene glycol solution. Transfer by gravity and a gas-lift device permit operation of these portable units without mechanical pumps. C. E. Hummel

Underground Storage

Jefferies, R. S. OAKFORD UNDERGROUND STORAGE PROJECT. *Petroleum Eng.*, 24, D35-D43 (1952) December.

A rather complete description is given of the mechanical equipment employed at the Oakford Storage Project of the New York State Natural Gas Co. and the Texas Eastern Transmission Corporation. O. T. Bloomer

Lane, R. L. and Thompson, B. J. ABSORPTION DRY DISTILLATION AND UNDERGROUND STORAGE. *Petroleum Eng.*, 24, C37-C39 (1952) November.

Some problems encountered in the intermediate pressure range (500-1200 psig.) of absorber operation are discussed. Also operations of dry distillation and underground storage are described. D. C. Gami

White, B. C. FLEXIBLE STANDBY FOR WASHINGTON GAS LIGHT INCLUDES NEW HIGH-PRESSURE STORAGE PLANT. *Am. Gas J.*, 177, 14, 15, 26 (1952) December.

Washington Gas Light Company's new peak shaving and standby plant utilizes both high-pressure natural gas and propane-air systems. Natural gas will be stored at 2240 psig in steel bottles 24″ O.D. by 40′-8″. The net capacity will be 56.8 MMCF, the propane storage capacity 41.7 MMCF. The entire installation of high-pressure and propane storage is underground. All lines and tanks are wrapped and cathodically protected. W. G. Bair

Wiederkehr, A. M. BARKER DOME GAS STORAGE PROJECT. *Petroleum Eng.*, 24, B7-B12 (1952) December.

Data are presented on Southern Union's Barker Dome underground storage project in the San Juan Basin. The project is not located close to markets but is generally advantageous. J. D. Parent

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Alcohol Fuels

Owtram, T. C. ECONOMIC ASPECTS OF ALCOHOL IN MOTOR FUEL. *J. Inst. Petroleum* (British), 38, 820-834 (1952) October.

A comparison of the costs of the various methods of improving the anti-knock value of motor gasoline is presented. Alcohol while offering an acceptable method of increasing the anti-knock ratings is at the present time prohibitive in cost. The supply of ethylene will reduce the price of ethyl alcohol in Europe but probably not enough to compete with gasolines produced by modern refinery methods. The production of alcohol from agricultural surplus and subsequent compulsory blending with gasoline has proved a costly and inefficient method of assisting national agriculture.

H. A. Dirksen

Catalyst Properties

Blue, R. W., Holm, V. C., Regier, R. B., Fast, Ed., and Heckelsberg, L. F. EFFECT OF GRANULE SIZE IN DEHYDROGENATION OF BUTANE AND IN A HYDROGEN TRANSFER REACTION. *Ind. Eng. Chem.*, 44, 2710-2716 (1952) November.

The effect of catalyst pellet size on a reaction have been studied and the results presented in table and graph form. The results for the two reactions studied (dehydrogenation of butane over a chromia-alumina catalyst and hydrogen transfer from decalin to isobutane over a silica alumina catalyst) indicate that mass transfer is a limiting factor in pellets larger than 35 mesh. H. A. Dirksen

Catalyst Regeneration

Kimberlin, C. N., Jr. and Bilisoly, P. J. (assigned to Standard Oil Development Co.) TREATMENT OF HYDROCARBON CONVERSION CATALYSTS. U. S. 2,618,613 (1952) November 18.

Silica-alumina gel cracking catalyst that has lost activity and selectivity, is reactivated by mixing with an aqueous solution containing 1-2% ammonium fluoride in a total amount of 2-3% based on the catalyst, agitating the slurry for 3 hours at 125° F., separating and drying

the treated catalyst followed by steaming the dry catalyst for 24 hours at 1050° F. and 16 psig. H. A. Dirksen

Easly, J. C. and Kellner, H. L. (assigned to Gulf Research and Development Co.) REGENERATION OF A FIXED-BED FISCHER-TROPSCH CATALYST. U. S. 2,609,345 (1952) September 2.

The patent claims an improved method of regenerating fixed beds of solid synthesis catalyst where by excessive temperature and frequent powdering of the catalyst is avoided. A mixture of air and inert gases are preheated to a temperature of 650° to 850° F. and passed over the catalyst, the temperature of the bed being maintained at 900° to 1000° F. by controlling the ratio of the gases.

H. A. Dirksen

Maxted, E. B. and Ball, G. T. THE REVERSIBILITY OF THE ADSORPTION OF CATALYST POISONS. PART I. THE REVIVAL OF POISONED CATALYSTS BY SIMPLE WASHING. *J. Chem. Soc.* (British) 4284-4288 (1952) November.

The desorption of thiophene, methyl sulphide, and mercury and zinc ions from a platinum catalyst has been examined by treating poisoned catalysts with various changes of a washing liquid, and it has been found possible completely to remove the poison. Similar results were obtained for the desorption of thiophene from a nickel surface, complete removal being, however, reached with somewhat greater difficulty than with platinum. Authors' Abstract

Cracking Catalysts

Brown, C. O. and Wainwright, R. B. SYNTHETIC FLUID CRACKING CATALYSTS... THEIR APPLICATION AND UTILIZATION. *Oil Gas J.*, **51**, 133-136 (1952) December 1.

It has been observed that fluid cracking catalyst applications cover a wide range of conditions, and that relative utilization or usage figures must be interpreted accordingly. Discussion has also centered on various other factors related to catalyst utilization and it is concluded that efficient utilization is accomplished as a result of the combined effects of (1) catalyst particle size, (2) operating conditions, (3) catalyst properties, and (4) unit design. Since normally the catalyst properties are maintained as constants, the third factor is not so much in the category of a variable as the other items. Authors' Abstract

Gutzeit, C. L. (assigned to Socony-Vacuum Oil Company, Inc.) HYDROUS ALUMINA CATALYST SUPPORT. U.S. 2,619,474 (1952) November 25.

The process patented for the preparation of improved alumina catalyst supports comprises precipitating hydrous aluminum oxide or aging freshly precipitated hydrous aluminum oxide in the presence of controlled amounts of an anion selected from the group consisting of cyanide, cyanate and thiocyanate ions in amounts ranging between 0.25 gram ion and about 2.0 gram ions per gram molecular weight alumina. H. A. Dirksen

Fischer-Tropsch Synthesis

Crowell, J. H. and Benson, H. E. (assigned to The United States of America) CATALYTIC CONVERSION OF CARBON MONOXIDE AND HYDROGEN TO HYDROCARBONS AND OXYGENATED ORGANIC COMPOUNDS. U.S. 2,617,816 (1952) November 11.

The patent relates to the catalytic conversion of synthesis gas to hydrocarbon by use of a submerged catalyst type of operation wherein the catalyst is directly immersed in a cooling liquid for the removal of the heat of reaction and improved catalyst temperature control.

H. A. Dirksen

Krebs, R. W. (assigned to Standard Oil Development Co.) HYDROCARBON SYNTHESIS. U.S. 2,614,114 (1952) October 14.

The invention relates to the maintenance of a portion of the synthesis catalyst in a reducing atmosphere at all times, in a fluidized bed reaction. W. J. Pleticka

May, W. G. and Sweetser, S. B. (assigned to Standard Oil Development Co.) HYDROCARBON SYNTHESIS PROCESS WITH TWO-STAGE COKE GASIFICATION. U.S. 2,620,348 (1952) December 2.

A two-stage system for the production of liquid hydrocarbons is described. The main feature is the use of the water gas shift reaction in presence of excess carbon dioxide and a small quan-

tity of steam, to produce a low H_2 to CO ratio in the second stage so that the optimum feed conditions for the iron catalyst synthesis may be realized. S. Mori

Hall, C. C., Gall, D. and Smith, S. L. A COMPARISON OF THE FIXED-BED, LIQUID-PHASE ("SLURRY"), AND FLUIDIZED-BED TECHNIQUES IN THE FISCHER-TROPSCH SYNTHESIS. *J. Inst. Petroleum* (British), 38, 845-876 (1952) October.

The comparison of techniques in the Fischer-Tropsch synthesis has brought about the conclusion that throughput of the fluidized process is the highest, and the selectivity of the liquid process is the greatest, all other considerations being independent of the particular technique. H. A. Dirksen

Rottig, W., Gross, H. W., Royen, P. and Schenk, K. (assigned to Ruhrchemie, A.G. and Lurgi G. f. Waermetechnik m.b.H.) PREPARATION OF AN IRON-SILICA GEL FISCHER-TROPSCH CATALYST. U.S. 2,617,774 (1952) November 11.

An improved iron-silica gel synthesis catalyst is claimed, the preparation of which comprises precipitating a hot solution of the iron nitrate with a hot caustic soda solution keeping the pH value about 6.8-7.2, washing the K_2O content down to at most 0.5 parts per 100 parts of iron, adding water for suspension and also a potassium water-glass solution to yield 20-25 parts SiO_2 per 100 parts iron. Thereafter nitric acid is added sufficient to yield K_2O to SiO_2 ratio of about 1:4 — 1:5, with subsequent drying and reducing at approximately 260-300° C. until the catalyst contains 30-50% of the total iron content as free iron. Water gas conversion is claimed in excess of 90% with a two-stage operation with a gas load 10-20 times that of normal. H. A. Dirksen

Rottig, W. (assigned to Ruhrchemie A.G.) CATALYTIC HYDROGENATION OF CARBON MONOXIDE WITH IRON CATALYSTS. U.S. 2,620,347 (1952) December 2.

A method of activating iron catalysts for the synthesis reaction is described wherein the catalyst is subjected to an extraction with a solvent approximately five times, to remove paraffins, to increase activity and catalyst life. H. A. Dirksen

Gas-Lift

Vincent, R. P. and Wilder, L. B. NEW GAS-LIFT SYSTEM. *Petroleum Eng.*, 24, B84-B86 (1952) November.

A novel ball-pump is described. Balls are put down one tube and gas pressure forces them back up the production tube moving a column of oil ahead. J. D. Parent

New Oil Line

THE STORY OF PLATTE PIPE LINE. *Oil Gas J.*, 51, 87-90 (1952) December 1; *Pipeline News*, 25, 31-49 (1953) January.

Details of design and construction of the 1056-mile crude-oil pipe line, its pump stations and communication facilities are discussed. D. C. Gami

Oil Future

Boatwright, J. W. 1967 — HOW MUCH OIL WILL WE NEED? *Petroleum Processing*, 7, 1612-1615 (1952) November.

The predicted demand for petroleum products in 1967 will be 10,400,000 bbls./yr. This is a 39% increase over present demand of 7,466,000 bbls./yr. Gasoline and distillate fuel will show a 44-46% increase while exports and residual fuel demands will be on the decrease. Pipe line capacity will have to be increased by 50% to transport the new load. W. G. Bair

Swearingen, J. E. 1967 — HOW MUCH OIL WILL WE HAVE? *Petroleum Processing*, 7, 1606-1611 (1952) November.

An optimistic forecast of U.S. oil production and reserves for the next 15 years. 1967 will find the U.S. with 11,000,000 bbl./day of production capacity. Proven reserves will be 38 billion bbls. which will be about 13 times the production rate. The production rate will be 21% less than the production capacity. W. G. Bair

Oil Storage

Ball, D. UNDERGROUND OIL STORAGE. *Petroleum Eng.*, 24, A49-A58 (1952) December.

A comprehensive review of oil storage in underground caverns or excavations (Edholm containers). The principal requirements for such storage are that any permeable parts of the container wall or roof are below the water table and that surrounding ground-water pressure

is higher than the oil storage pressure at the same depth. Suitable rock formations, operating and construction methods and economic considerations are discussed. H. R. Linden

Petroleum Properties

McNab, J. G., Smith, P. V., Jr., and Betts, R. L. THE EVOLUTION OF PETROLEUM. *Ind. Eng. Chem.*, 44, 2556-2567 (1952) November.

In order to obtain a better understanding of the evolution of petroleum, an extensive review of crude oil assay data for United States oil fields has been made. The study emphasizes that chemical changes in the primary crude oils after accumulation in reservoirs are probable. A general increase in the A.P.I. gravity and in the volatility of the crude oils is observed with increasing depth of burial. Similar data were obtained in experimental work on some Venezuelan and Canadian oils. Thermal cracking studies on a "young" crude indicated that it would not be significantly changed at a temperature of 150° F. within geologic time. It was more sensitive to cracking than the average gas oil, however, and at 250° F. it would be 99% converted to lighter products in 400,000,000 years. Contact of such young oils with mildly catalytic strata during a portion of their history might permit complete conversion at the lower temperatures.

Authors' Abstract

Shale Distillation

Jahnig, C. E. (assigned to Standard Oil Development Co.) FLUIDIZED SHALE DISTILLATION. U.S. 2,618,588 (1952) November 18.

The patent applies to a process for distilling oil shale in a fluidized bed with the heat required for distillation being supplied by sensible heat of hot spent shale that is heated in a separate combustion zone and circulated to the fluidized bed in the retorted zone. E. J. Pyrcioch

Nicholson, E. W. and Griffin, L. I. (assigned to Standard Oil Development Co.) CONTINUOUS RETORTING OF OIL SHALE. U. S. 2,618,589 (1952) November 18.

The patent relates to a fluidized-bed type of retort for distilling oil shale. E. J. Pyrcioch

Shale Pyrolysis Products

Brantley, F. E., Cox, R. J., Sohns, H. W., Barnet, W. I., and Murphy, W. I. HIGH TEMPERATURE SHALE OIL — PRODUCTION AND UTILIZATION. *Ind. Eng. Chem.*, 44, 2641-2647 (1952) November.

The yields and compositions of the gaseous and liquid products from Green River oil shale retorted at temperatures from 1200 to 1800° F. are presented. The liquid products at these high temperatures contain large percentages of aromatics and the gas yields are substantial. The compositions of the gases produced are similar to those of high Btu oil gases produced at equivalent cracking temperatures, except for high concentrations of carbon monoxide and dioxide. H. R. Linden

7. ANALYTICAL METHODS AND TESTS

Chromatography

Chang, W. H., Hossfeld, R. L. and Sandstrom, W. M. IDENTIFICATION OF PHENOLS BY PAPER PARTITION CHROMATOGRAPHY. *J. Am. Chem. Soc.*, 74, 5766-5767 (1952) November 20.

In order to overcome difficulties encountered in the paper partition chromatography of possible phenols these compounds were first allowed to couple with diazotized sulfanilic acid. The resulting mixture was then satisfactorily chromatographed. R. Parker

Combustibles Detector

Spracklen, S. B. (assigned to Union Carbide & Carbon Corp.) APPARATUS FOR MEASURING THE COMBUSTIBLE CONTENT OF A GAS. U.S. 2,619,409 (1952) November 25.

This apparatus for measuring the combustible content of a gas consists of a reference platinum filament in a cell of air, and an identical filament exposed to the gas being investigated. Improved accuracy and reduced need for calibration have been provided by spotwelding chromel-nickel thermocouples directly to the filaments. No significant heat conduction by these 34-gage thermocouples is claimed. They are oppositely connected to compensate for any voltage change of the filament or change in the air temperature. Either alternating or direct current may be used with this apparatus.

C. E. Hummel

Flash Point Tester

Jacobs, R. B. AUTOMATIC FLASH-POINT INSTRUMENT. *Oil Gas J.*, 51, 124-128 (1952) November; *Nat. Fire Protection Assoc. Quart.*, 46, 124-129 (1952) October.

A "go-nogo" automatic flash-point device has been developed by Standard Oil Co. (Ind.) The machine determines whether or not a sample of oil will flash at a predetermined temperature. Accuracy is comparable with that of the best laboratory methods and the measurement requires only 2½ minutes. D. M. Mason

Hydrocarbon Determination

Mader, P. P., Heddon, M. W., Lofberg, R. T., and Koehler, R. H. DETERMINATION OF SMALL AMOUNTS OF HYDROCARBONS IN THE ATMOSPHERE. *Anal. Chem.*, 24, 1899-1902 (1952) December.

A spectrophotometric method for determining small concentrations of hydrocarbons in the atmosphere has been developed. It employs the use of a specially built 100-cm. gas cell supplied with rock-salt windows and inserted between the light source compartment and receiver compartment of a Beckman infrared spectrophotometer. Because of the large volume of the new cell, the entire gas sample can be swept into the light path of the instrument. The hydrocarbon sample is collected by a freeze-out technique, using a Shepherd sampler immersed in liquid oxygen. Based on the collection of the condensates of a 60-liter air sample, the instrument records the presence of 23 micrograms of hexane, or less than 0.1 p.p.m. of this hydrocarbon. The results obtained for known hydrocarbon concentrations are accurate and consistent. This method was successfully applied to the determination of hydrocarbons from air streams over polluted areas or inside industrial establishments. Authors' Abstract

Mass Spectrometry

Zemany, P. D. IDENTIFICATION OF COMPLEX ORGANIC MATERIALS. *Anal. Chem.*, 24, 1709-1721 (1952) November.

A method of identifying complex organic materials is described which utilizes a mass spectrometer to characterize the gaseous pyrolysis products of the materials. D. V. Kniebes

Metals in Oils

Karchmer, J. H., and Gunn, E. L. DETERMINATION OF TRACE METALS IN PETROLEUM FRACTIONS. *Anal. Chem.*, 24, 1733-1741 (1952) November.

Colorimetric and spectroscopic methods which have proved adequate for determining individual metals in milligram quantities of petroleum ash are described. D. V. Kniebes

Milner, O. I., Glass, J. R., Kirchner, J. P. and Yurick, A. N. DETERMINATION OF TRACE METALS IN CRUDES AND OTHER PETROLEUM OILS. *Anal. Chem.*, 24, 1728-1732 (1952) November.

Increasing concern of the petroleum industry with metallic traces present in crude oils has necessitated the development of quantitative analytical methods. A procedure has been developed for the decomposition of petroleum oils and the analysis of the resulting ash for iron, nickel, vanadium, and copper. The method comprises a novel wet-ashing technique whereby crudes and petroleum fractions can be conveniently reduced to an inorganic residue with minimum risk of loss of metals. The ash is solubilized, and separate aliquots of the solution are taken for the determination of the individual elements. Iron, nickel, and vanadium are determined photometrically after reaction with o-phenanthroline, dimethylglyoxime, and phosphotungstic acid, respectively. Copper is determined polarographically after preliminary isolation by microelectrodeposition. The effect of the ashing technique on the recovery of metals from representative stocks is discussed. Data are presented to establish the accuracy and precision of the recommended method when applied to metal concentrations as low as 0.1 p.p.m. The method has been applied to a number of typical petroleum stocks, and its effectiveness in determining material balances in refining processes is demonstrated. The values found for the iron, nickel, vanadium, and copper content of a number of crude oils are also included. Authors' Abstract

Mercaptan Determination

Mapstone, G. E. DIRECT TITRATION OF GASOLINE MERCAPTANS. *Petroleum Processing*, 7, 1655 (1952) November.

Sodium cresylate solution with solutizer (butyl alcohol) is shaken with the gasoline to extract

mercaptans. Titration is carried out with silver nitrate using sodium nitroprusside as indicator, in presence of an amine which prevents precipitation of silver oxide. D. M. Mason

Nitrogen in Oils

Lake, G. R. DETERMINATION OF NITROGEN IN PETROLEUM AND SHALE OIL. *Analytical Chem.*, 24, 1806-1811 (1952) November.

Cooperative work of twenty laboratories has demonstrated that nitrogen in petroleum and shale oils may be accurately determined by the Kjeldahl, Dumas, or ter Meulen methods if careful attention is given to the pertinent operational variables. The digestion temperature must be maintained at about 700 degrees F. for one hour in the Kjeldahl method. Mercury is the preferred catalyst. Twenty determinations may be made per man-day. Meticulous burning is required in the Dumas method to assure complete combustion. The gas-recycle, double furnace, and mass spectrometer correction modifications provide safety features to prevent or correct for improper combustion. The ter Meulen catalytic hydrogenation method is applicable to lower concentrations of nitrogen than the Dumas method. Fourteen determinations may be made per man-day.

D. M. Mason

Organic Spectroscopy

Shreve, O. D. INFRARED, ULTRAVIOLET, AND RAMAN SPECTROSCOPY. *Anal. Chem.*, 24, 1692-1699 (1952) November.

The discussion concerns the advantages and limitations of infrared, ultraviolet, and Raman spectroscopy in the examination of complex compounds such as petroleum and coal tar fractions, animal fats, vegetable oils, essential oils, plant extracts, and resins. Practical applications of the various analytical techniques discussed are illustrated. R. Parker

Oxygen in Gases

Buechner, K. OXYGEN DETERMINATION IN GASES BY MEANS OF CHROMOUS CHLORIDE. (DIE SAUERSTOFFBESTIMMUNG IN GASEN MITTELS CHROM CHLORIDLOESUNG). *Brennstoff-Chemie* (German), 33, 327-329 (1952) October 15.

Concentrated (15-30%) solutions of chromous chloride, pure and in completely reduced state, give accurate results in determination of oxygen by the Orsat absorption method. Data on speed of absorption, stability and absorption capacity for gases of high or low O_2-content are discussed. O.P. Brysch

Williams, D. D., Blachly, C. H., and Miller, R. R. DETERMINATION OF TRACE OXYGEN IN GASES. *Anal. Chem.*, 24, 1819-1821 (1952) November.

The oxidation of an alkaline solution of pyrogallic acid by trace amounts of oxygen in gas samples is the basis of this colorimetric method. C. E. Hummel

Sulfur Determination

Budd, M. S. and Bewick, H. A. PHOTOMETRIC DETERMINATION OF SULFIDE AND REDUCIBLE SULFUR IN ALKALIES. *Anal. Chem.*, 24, 1536-1540 (1952) October.

Methods applicable to all alkali products were developed for the determination of sulfide and reducible sulfur compounds. The hydrogen sulfide evolved on acidification, or by stannite and nascent hydrogen reduction, is passed into zinc acetate and converted to methylene blue by reaction with p-aminodimethylaniline. The range of determination is 0.2 to 100 p.p.m. of sulfur using a 3-gram sample. A relatively simple apparatus has been designed for the evolution of hydrogen sulfide, precipitation as zinc sulfide, and conversion to methylene blue for photometric measurement. Losses due to oxidation of sulfide in alkali carbonate samples are minimized by pelleting such samples before acidification. Authors' Abstract

Eccleston, B. H., Morrison, M. and Smith, H. M. ELEMENTAL SULFUR IN CRUDE OIL. *Anal. Chem.*, 24, 1745-1754 (1952) November.

Elemental sulfur was determined in 17 crude oils by a polarographic method which is believed to be accurate and to respond correctly to the presence of elemental sulfur in the oil. Particular attention was paid to methods of sampling and to subsequent handling of the samples. The content of elemental sulfur in the 17 oils varied from 0 to 1.3%, and explains, in part at least, the large evolution of hydrogen sulfide often observed at temperature near 200 degrees C. when crude oils are distilled.

D. M. Mason

Surface Study Methods

Smith, D. E. A SIMPLIFIED SURFACE AREA APPARATUS AND CATALYST TESTER. *Petroleum Eng.*, 24, C52-C60 (1952) November.

A control laboratory apparatus eliminating the tedious and time consuming calculations of the standard B.E.T. surface area determination is presented, and an accuracy sufficiently high for control purposes is claimed. W. J. Pleticka

Tufts, C. F. DETERMINATION OF SURFACE GEOMETRY AND STRUCTURE BY MICROSCOPY AND DIFFRACTION. *Anal. Chem.*, 24, 1700-1708 (1952) November.

In any analysis that claims to give a precise description of a sample of matter, the determination of surface geometry and structure is obligatory. This paper shows how the tools of light microscopy, electron microscopy, and electron diffraction have been used together successfully to determine adequate surface descriptions in the analysis of materials for ingredients of unknown constitution.

Author's Abstract

Synthetic Gasolines

Feldman, J. and Orchin, M. COMPOSITION OF GASOLINE FROM COAL HYDROGENATION. *Ind. Eng. Chem.*, 44, 2852-2856 (1952) December.

The 50 to 150° C. fraction of oil from coal hydrogenation was analyzed for paraffins of each molecular weight range, for naphthenes, distinguished as cyclopentanes, monosubstituted cyclopentanes, disubstituted cyclopentanes, cyclohexane, monosubstituted cyclohexanes, and disubstituted cyclohexanes, and individual C_6-C_8 aromatics. The 150 to 180° C. fraction was analyzed for hydrocarbon type. Techniques employed included distillation, silica gel percolation, mass spectrometers and ultraviolet spectrometry. Paraffin-naphthene analysis by refractivity-intercept and carbon-hydrogen ratio methods were compared with mass spectrometer analysis and showed generally good agreement. It is indicated that with conversion of napthenes to aromatics up to 18 gallons of benzene per ton of coal might be obtained. D. M. Mason

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Brantley, F. E. HIGH TEMPERATURE SHALE OIL. p. 30

McNab, J. G. THE EVOLUTION OF PETROLEUM. p. 30

8. GENERAL AND PHYSICAL CHEMISTRY

Carbon-Oxygen Kinetics

Brown, F. THE EXCHANGE OF C^{14} BETWEEN ELEMENTARY CARBON AND ITS OXIDES. *Trans Faraday Soc.* (British), 48, 1005-1014 (1952) November.

The kinetics of the carbon-carbon dioxide reaction mechanism is investigated by reacting a pure sample of a radioactive carbon in the form of $*CO_2$ on sugar carbon and graphite surfaces at various temperatures. Two types of carbon surface are indicated, (1) where $*CO_2$ picks up a C atom at the surface to form $*CO + CO$, and (2) where $*CO_2$ bond is broken and the $*C$ is absorbed into the carbon surface.

S. Mori

Electron Microscopy

Heidenreich, R. D. METHODS IN ELECTRON MICROSCOPY OF SOLIDS. *Rev. Sci. Instruments*, 23, 583-944 (1952) November.

Methods of replicating solid surfaces for electron microscopy are reviewed and compared. Preparation of metal surfaces is discussed, and the advantages of employing electron diffraction techniques in evaluating prepared surfaces are pointed out. Author's Abstract

Fractional Fusion

Aston, J. G. and Mastrangelo, V. R. (assigned to Phillips Petroleum Co.) FRACTIONAL FUSION APPARATUS. U.S. 2,614,909 (1952) October 21.

This invention relates to an apparatus for purification of materials by partial melting after fusion. The melted part of the material is then withdrawn and a further amount of material melted for additional purification. Means are provided for accelerating equilibrium and for improving the distribution of heat throughout the solid being purified. O. T. Bloomer

Flame Reactions

Calcote, H. F., Gregory, C. A., Jr., Barnett, C. M., and Gilmer, R. B. SPARK IGNITION EFFECT OF MOLECULAR STRUCTURE. *Ind. Eng. Chem.*, 44, 2656-2662 (1952) November.

The results of the study of the minimum ignition energies of a wide variety of compounds are presented. E. F. Searight

Hydrocarbon Properties

Guthrie, V. B. PROJECT 44 — IN THE CARDS. *Petroleum Processing*, 7, 1769-1771 (1952) December.

The API Research Project 44 is now putting its data on physical and thermodynamic properties of hydrocarbons on punched cards. 36,500 punched cards are used to cover 100,000 entries on more than 1000 different compounds. The data included is the same as has already appeared on the loose-leaf sheets. These have been coded and are now punched out on the IBM cards. The set of machines: sorter, collator, accounting machine and calculator, can be rented from IBM, and sets of cards can be purchased from the project. C. A. Simms

Pitzer, K. S. and Brattain, R. R. THERMODYNAMIC PROPERTIES OF HYDROCARBONS AND RELATED COMPOUNDS. *Oil Gas J.*, 51, 352-356 (1952) November 17.

API Research Project 50 was initiated in July 1952 with the objective of a better understanding of the thermodynamic properties of hydrocarbons and related compounds in terms of molecular structure. Internal molecular forces will be measured and from this information thermodynamic properties will be calculated. Techniques used on naphthalene are discussed as an example. They include: infrared and Raman spectra on liquid, vapor, and dissolved naphthalene and on deuterium-substituted naphthalenes; polarized infrared spectra on oriented crystals; and determination of specific heat and entropy by calorimetry. An automatic-recording grating spectrometer has been constructed to extend infrared spectra to the low frequency (130 wave-numbers) region. D. M. Mason

H_2S Dissociation

Sehon, A. H. THE DISSOCIATION ENERGIES OF THE FIRST AND SECOND BOND IN H_2S AND SOME COMMENTS ON A RECENT PAPER BY FRANKLIN AND LUMPKIN. *J. Am. Chem. Soc.*, 74, 4722-4723 (1952) September 20.

Choice of data for the calculation of dissociation energies is discussed. D. M. Mason

Thermal Conductivity

Keyes, F. G. ADDITIONAL MEASUREMENTS OF HEAT CONDUCTIVITY OF NITROGEN, CARBON DIOXIDE, AND MIXTURES. *Trans. Am. Soc. Mech. Eng.*, 74, 1303-1306 (1952) November.

Thermal conductivity measurements for nitrogen, carbon dioxide and their mixtures are reported from temperatures of 50° C. to 350° C. The results indicate that previous correlations of Enskog or Lindsay and Bromley do not explain the behavior of the gas mixtures. The relation of various energies to thermal conductivity is discussed in order to explain the effect of temperature on heat transfer by conduction. The authors point out that there is much data on heat capacity and viscosity, but more work is needed on thermal conductivity before an exact relation can be found. R. E. Peck

Viscosity Data

Carmichael, L. T. and Sage, B. H. VISCOSITY OF LIQUID AMMONIA AT HIGH PRESSURES. *Ind. Eng. Chem.*, 44, 2728-2732 (1952) November.

The viscosity of ammonia in the liquid phase was determined for the temperature range 40° to 220° F., and pressure range 200 to 6,000 psi. N-pentane was used to calibrate the rolling-ball viscometer in the laminar-flow region. The data are presented in both graphical and tabular form and indicate that the effect of pressure is small. W. W. Clauson

Granet, I. and Kass, P. THE VISCOSITY THERMAL CONDUCTIVITY AND SPECIFIC HEAT OF CARBON DIOXIDE AT ELEVATED PRESSURES AND TEMPERATURES. *Petroleum Refiner*, 31, 137-138 (1952) November.

This is one of a series of articles on the high temperature, high pressure properties of gases. The pressure extends to 2,000 psi and the temperature to 1,500 degrees F. The data are presented for carbon dioxide in the form of graphs; no new experimental data is presented. W. W. Clauson

9. ORGANIC CHEMISTRY

Benzaldehyde Synthesis

Boyle, J. L. A NEW PRODUCT FROM BENZENE AND BLAST FURNACE GAS. *Blast Furnace & Steel Plant*, **40**, 1443-1447 (1952) December.

Results of calculations and laboratory tests show the feasibility of producing benzaldehyde (and higher aldehydes) at an integrated blast furnace and coke oven plant. Carbon monoxide (at furnace gas concentrations) and benzene, at temperatures of 15° to 25° C., autoclaved at 500 atm. with $AlCl_3$ or BF_3-HF (Friedel-Crafts reaction) give a 22 to 36 mole-% conversion. O. P. Brysch

Olefin Recovery

Moore, F. J., Hess, H. V. and Gould, R. K. (assigned to The Texas Co.) RECOVERY AND UTILIZATION OF OLEFINS FROM GASES. U.S. 2,617,839 (1952) November 11.

Improved recovery of olefins from refinery gases, preferably of low olefinic content (25% or less) is claimed. The fuel gas is contacted in a fluidized bed with a phosphoric acid polymerization catalyst or silica-alumina cracking catalyst under conditions so that the olefins are absorbed on the catalyst to form esters. The off-gas is essentially olefin-free. The rich catalyst is heat-treated to release propylene polymer and almost pure ethylene. Moderate temperature and pressure requirements are attractive features of the process.

W. G. Bair

Petrochemical Industry

Kornfeld, J. A. PETROCHEM FORECAST. *Oil Gas J.*, **51**, 250 (1952) November 17.

Petrochemical production is expected to reach 17 billion pounds this year. This will account for more than 70% of all organic chemical production. Capital investment is close to 2 billion dollars. J. D. Parent

Tracy, O. V. PETROLEUM'S ROLE IN CHEMISTRY DESTINED FOR CONTINUING EXPANSION AS DEMAND GROWS. *Oil Gas J.*, **51**, 70, 72, 74 (1953) January 5.

The factors that are responsible for need of greater production of aromatics are generally discussed. W. J. Pleticka

10. CHEMICAL ENGINEERING

Cooling Tower Practise

Baker, D. R. and Mart, L. T. ANALYZE COOLING TOWER PERFORMANCE BY THIS METHOD. *Petroleum Refiner*, **31**, 97-103 (1952) October.

Cooling tower performance is correlated as a volumetric coefficient, or the mass transfer coefficient per unit volume divided by the mass flow rate of gas. Curves are presented showing how this coefficient varies with water loading and the rate of gas flow. The same design technique is applied to spray towers. In this case, the coefficient is a function of tower height as well as other variables encountered in cooling towers. R. E. Peck

Rice, J. K. TREATMENT OF RECIRCULATED COOLING WATER. *Corrosion*, **8**, 375-380 (1952) November.

The variables of velocity, viscosity, dissolved solids, temperature, and pH are discussed as they affect corrosion rates. Several methods of water treatment are given. Much of the published information on water treatment is conflicting and there is a great need for more fundamental data. W. G. Bair

Engineering and Safety

Kramer, W. H., Jr. SAFETY IN UTILITY LP GAS PLANTS DEPENDS ON BASIC ENGINEERING AND SOUND CONSTRUCTION—PART II. *Am. Gas J.*, **177**, 18, 19, 32 (1952) November.

This second section deals with piping accommodations, installations, and protection against external damage and corrosion. A non-chalking white paint is now being recommended for LP-gas installations instead of aluminum.

W. G. Bair

Fluidization

Peery, N. E. (assigned to Shell Development Co.) PROCESS AND APPARATUS FOR CONTACTING FLUIDIZED SOLIDS WITH GASEOUS FLUIDS. U.S. 2,617,708 (1952) November 11.

A novel reactor for fluid catalytic cracking is claimed. A cylindrical shell with conical top

and bottom is divided vertically into 4 separate sectors. The reaction space is contained within these sectors while narrow spaces between sectors can be utilized as a stripper section. Steam is used as the stripping gas.

W. G. Bair

Shuster, W. W. and Kisliak, P. THE MEASUREMENT OF FLUIDIZATION QUALITY. *Chem. Eng. Progress*, 48, 455-458 (1952) September.

A diaphragm instrument was constructed to measure small pressure drops and fluctuations across sections of a fluidized bed. Results indicated that pressure drop is a periodic function. The cycle time is a function of gas rate and the type of solid which is used. Visual observation confirmed the fact that these pressure fluctuations are a measure of the factors of fluidization such as bed expansion and turbulence.

R. E. Peck

Foundation Design

Brown, A. A. WHAT SIZE FOUNDATION FOR YOUR STILLS AND TOWERS? *Chem. Eng.*, 59, 136-148 (1952) October.

A method is presented for determining foundation diameters for supporting tall structures and for calculating maximum soil pressure.

E. J. Pyrcioch

Gas-Liquid Separator

Shobe, H. E. (assigned to Phillips Petroleum Co.) GAS SEPARATION APPARATUS WITH LIQUID LEVEL CONTROLLER. U. S. 2,616,514 (1952) November 4.

A liquid-level controller for gas-liquid separators, which operates without moving parts in the high-pressure section of such apparatus, is described.

D. M. Mason

Heat Transfer

Chu, Y. C. and Storrow, J. A. HEAT TRANSFER TO AIR FLOWING THROUGH HEATED TUBES. PART I EFFECT OF ENTRY AND EXIT CONDITIONS. PART II EFFECT OF LENGTH TO DIAMETER RATIO. *Chem. Eng. Sci.* (British) 1, 220-229 (1952) September.

A preliminary study has been made of the effect of various end conditions on surface conductances to air flowing through a heated tube. The effects of thermometric errors and flow disturbances lead to characteristic forms for the variation of surface conductance with flow characteristics. The inlet disturbance produced large changes from the accepted correlation forms for nominally streamline flow for values of Graetz number between 5 and 300 in tubes with lengths 12 to 48 times their diameters. Surface conductances have been measured in the transfer of heat from the wall of a steam-heated tube to air flowing through the tube of 1 in. diameter, the flow being disturbed at the inlet by a perforated plate and gauze. A range of L/D^1 of 4:1 has been tested.

Authors' Abstract

Chu, Y. C. and Storrow, J. A. HEAT TRANSFER TO AIR FLOWING THROUGH PACKED TUBES. *Chem. Eng. Sci.* (British), 1, 230-237 (1952) September.

A study has been made of the transfer of heat from a heated wall to air flowing through packed beds in a tube of 1 in. dia. The data are correlated by equations. The thermal conductivity of the packing has no influence in region (a) but affects the transfer in region (b). The flow rates used were lower than those reported by Leva, but it appears likely that the present data trend to agreement with the functions proposed by Leva as the flow rate is increased. The most significant features of these results are that in the flow ranges studied the length of the packed tube is an important variable, but the packing diameter has little effect on the heat transfer.

Authors' Abstract

Schmid, W. E., Bartkus, E. P. and Corrigan, T. E. MORE DATA ON HEAT TRANSFER TO FLUIDIZED SOLIDS. *Chem. Eng.*, 59, 172-174 (1952) October.

Correlations are presented for heat transfer coefficients on the heating of pulverized coal and limestone fluidized in a stream of air.

C. von Fredersdorff

Pebble Heater

Simms, R. K. (assigned to Phillips Petroleum Co.) PEBBLE HEATER AND METHOD OF CONVERTING HYDROCARBONS. U. S. 2,614,968 (1952) October 21.

A pebble heater is claimed, in which the carbon-coated pebbles, lift-elevated from the base of

the reactor, are burned off with oxygen in a sloped cylindrical heating chamber, which also acts as a size-classifying unit so that pebbles of different size groups may be heated to different temperatures and gravity-delivered by conduits to different superimposed zones of the reactor, where the hydrocarbon material for conversion is injected (with or without steam) at the proper level. O. P. Brysch

Reactor

Miller, E. B. (asigned to Jefferson Lake Sulphur Co.) CATALYTIC REACTOR. U. S. 2,617,718 (1952) November 11.

A reactor providing relatively thin beds of granular catalyst material so disposed as to provide even flow of fluid through the bed, and easy removal and replacement of the catalyst, is described. D. M. Mason

Scrubber

Doyle, H. (assigned to The Consolidated Mining and Smelting Co. of Canada) GAS SCRUBBER. U.S. 2,621,754 (1952) December 16.

This invention is directed to the efficient and economical separation of suspended particles of submicron size from gases. The gas stream to be treated is ejected at high velocity into a bath of liquid, whereby the suspended matter is driven into and retained by the liquid. The purified gas at low velocity is then treated for removal of entrained liquid. Dust burdens of 1 to 500 mg./cu.ft. can be treated effectively, and gas volumes up to 10,000 cu.ft./min. can be handled by a single unit. C. E. Hummel

Solids Handling

Olive, T. R. SOLIDS FEEDERS. *Chem. Eng.*, 59, 163-178 (1952) November.

This report assembles information on available solids feeders based on data supplied by users and manufacturers and discusses some of the problems encountered in solids feeding and some of their solutions. Information on the following type of feeders is given: volumetric solids feeders; semi-solids feeders and slurry feeders. A discussion of bins and dischargers is also included. E. J. Pyrcioch

Spray Drying

Sjenitzer, F. SPRAY DRYING. *Chem. Eng. Sci.* (British) 1, 101-117 (1952) April.

The author presents a fundamental analysis of heat transfer and mass transfer as it is applied to drops in spray drying. The drying fluid is subdivided into a period of deceleration and a period of constant settling rate. The effect of air humidity and temperature on the drying rate is analysed with the use of humidity charts. The period of reduced vapor pressure is treated as an increase in the solid temperature. The effective driving force for mass transfer is taken as the humidity and the results are presented as the height of a transfer unit. R. E. Peck

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Anderson, J. R. PURIFICATION OF DISTILLED COKE OVEN BENZENE. p. 21

Bolzinger, A. HEAT TRANSMISSION, ABSORPTION, AND APPLICATION TO TREATMENT OF GAS. p. 40

Fischer, H. G. GASIFICATION OF CARBONACEOUS MATERIALS. p. 21

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Flow Control

Conkling, W. C. (assigned to Wallace & Tiernan Co., Inc.) GAS FLOW CONTROL APPARATUS. U. S. 2,619,114 (1952) November 25.

An orifice-type flow controlling instrument is described. By suitably incorporating a resistance (variable orifice) in the flow line, the flow rate is made proportional to the pressure drop across the orifice. D. C. Gami

Lasselle, R. E. HOW NEW ENGLAND COMPANIES SOLVED PROBLEMS OF ORIFICE METERING. *Gas Age*, 110, 25, 61 (1952) November 6.

A detailed account of the installation of orifice meter runs by New England Power Service Co. when they changed to natural gas. The com-

pany recently completed 35 new crifice meter runs at various points in their distribution system. Factors affecting accuracy of measurement are discussed. W. G. Bair

Saxton, R. P. INSTRUMENTATION IN SCRUBBING, REGULATING, MIXING AND METERING OF NATURAL GAS. *Gas Age*, **110**, 23-24 (1952) November 6.

A description of the new meter installations used by the Derby Gas Co. and Electric Co. at Shelton, Conn. when they converted from manufactured to natural gas. Of chief interest is a dual meter run with a differential limit controller to give a range of flow variations from 23 to 1. W. G. Bair

Pumps

Cable, J. A. SELECTION OF CENTRIFUGAL PUMPS. *Heating & Ventilating*, **49**, 86-96 (1952) December.

A comprehensive article covering pump capacity, type of liquid pumped, and special materials of construction. Very basic and useful information is given in detail.

W. G. Bair

Storage Tanks

Cogan, L. J. TANK CONSTRUCTION FOR PRODUCTS STORAGE. *Petroleum Eng.*, **24**, A76-A78 (1952) December.

Some of the basic types of tanks used for storage of petroleum products are described. Construction features and uses of each type and a discussion of underground storage tanks are given. The author feels that underground storage is of increasing importance because of military defense considerations.

E. J. Pyrcioch

Jackson, J. O. WHAT'S HAPPENING IN LIQUID AND GAS STORAGE. *Petroleum Eng.*, **24**, A61-A70 (1952) December.

Recent tank designs for liquid and gas storage at high pressures are reviewed. The spherical tank is widely used but the maximum wall thickness for unstressed vertical pressure vessels is fixed at 1¼". This fixes the maximum tank size for a given service pressure. This has led to designs based on the sphere but arranged to give several interconnected spheres or spheroids. Large double-wall, insulated tanks are used for low temperature storage of volatile petroleum liquids. W. G. Bair

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Corbett, P. F. B.C.U.R.A. DEW-POINT METER. p. 19

Jacobs, R. B. AUTOMATIC FLASH-POINT. p. 31

Spracklen, S. B. MEASURING COMBUSTIBLE CONTENT OF A GAS. p. 30

Thurlow, G. G. PROBE FOR INVESTIGATION OF CORROSIVE BOILER FLUE GASES. p. 20

12. MATERIALS OF CONSTRUCTION

Anti-Corrosive Plastics

RESIN-PETROLEUM COKE MATERIAL BEATS CORROSION. *Can. Chem. Processing*, **36**, 80 (1952) November.

A resin-petroleum coke material which has many anti-corrosive features is discussed. This material can be poured or cast, has a maximum operating temperature of 350° F., is basically a non-conductor, and is a good insulator. It has proved especially useful in processes involving hydrofluoric acid, and wet chlorine and chlorine water. No specific details are given concerning its composition.

J. J. Wrozina

Zimmerman, O. T. and Lavine, I. HAVEG EQUIPMENT. *Chem. Eng. Costs Quart.*, **2**, 89-100 (1952) October.

Properties of the various grades of Haveg, and types, sizes, and cost of Haveg equipment are described. D. M. Mason

Cathodic Protection

Thornton, D. P., Jr. DOW CONQUERS SEA WATER CORROSION. *Petroleum Processing*, **7**, 1640-1643 (1952) November.

Dow Chemical of Texas uses sea water as a

process cooling medium and as a raw material. Their cathodic protection program is described.
R. A. Brown

Werkin, L. C. CATHODIC PROTECTION LICKS CORROSION. *Petroleum Refiner*, 31, 122-124 (1952) October.

A comprehensive picture is given of the losses caused by corrosion in maintenance, replacement costs, over-design of equipment and product losses due to downtimes. It presents cathodic protection as a positive, controllable and inexpensive method of preventing corrosion.
R. A. Brown

Corrosion

Denison, I. A. and Romanoff, M. CORROSION OF GALVANIZED STEEL IN SOILS. *J. Research Nat. Bur. Standards*, 49, 299-306 (1952) November.

The results of measurements of the corrosion are reported for galvanized steel and for bare steel and zinc as reference materials after exposure to different soil conditions for a maximum of 13 years. The magnitude and progress of corrosion of galvanized steel as determined by weight loss and pitting is interpreted in terms of the environmental conditions to which the specimens were exposed. From analysis of data on the corrosion of galvanized specimens having different weights of coating, minimum coating requirements for different environmental conditions are suggested.
Authors' Abstract

NACE. Technical Practices Committee I-G. FIELD EXPERIENCE WITH CRACKING OF HIGH STRENGTH STEELS IN SOUR GAS AND OIL WELLS. *Corrosion*, 8, 351-354 (1952) October.

This is a report by Committee TP-1G on accumulated field experience of several companies with corrosion cracking of oil well tubular goods and well-head fittings in sour gas and oil wells. This cracking effect has been associated principally with use of high-strength steels in sour gas-condensate wells. Although relatively few failures have been experienced, the problem is a serious one in view of the high pressures involved and the rapid, unpredictable nature of the corrosive attack. Descriptions of failed tubing, casing, and wellhead fittings are given together with data obtained from stressed specimens of various alloys placed in flowlines of wells in several fields. These data show that sulfide corrosion cracking is associated with alloys of high strength, i.e., high hardness, and that the effects may vary among individual wells owing to differing producing conditions and fluid compositions. Possible remedial measures are discussed. Authors' Abstract

Peabody, A. W. CORROSION CONTROL ECONOMICS. *Am. Gas J.*, 177, 27, 36 (1952) November.

The known means of corrosion mitigation and their application towards a more economical operation of gas distribution systems are reviewed. R. A. Brown

Glass Pipe Line Wrappings

Farris, R. W. THE ROLE OF FIBROUS GLASS IN UNDERGROUND PIPE PROTECTION. *Pipe Line News*, 24, 31-34 (1952) November.

The article is a description of the development, theory, and supporting test procedures behind the widespread use of glass mats for pipe-line enamel reinforcement. R. A. Brown

Inhibitors

Ulmer, R. C. and Wood, J. W. PREVENTION OF CORROSION IN COOLING WATER. *Corrosion*, 8, 402-406 (1952) December.

General considerations involved in reducing corrosion by the several types of cooling water systems are discussed, and information on laboratory research on inhibitors by the Drew Company is given. Addition of chromates in correct concentrations stopped corrosion but insufficient amounts caused pitting. Silicate-phosphates gave better results. Mechanism of silica-base inhibitors is discussed. Conclusions reached indicate the controlled calcium carbonate method requires too close control, chromates are effective in proper concentration but relatively expensive unless small volumes of water are involved. Erratic results were obtained with systems involving complex phosphates at pH 6.0 and chromate-phosphate combinations. Good results were obtained with silicate-phosphate combinations. Authors' Abstract

Pipe Stress-Failures

Lodge, J. W. and Manning, G. K. STRESS FAILURE IN BIG-INCH GAS-TRANSMISSION PIPE. *Oil Gas J.*, **51**, 344-350 (1952) November 17; *Pipe Line News*, **25**, 24-27 (1953) January.

Stress measurements are reported on buried 25-ft. sections of 20" O.D. grade X 46 electric-welded line pipe. The pipe was deliberately forced out of round. The results indicated that small flat spots and dents cause large local bending stresses on applications of internal pressure. It is recommended that the proof-testing pressure should be 150 psi higher than the maximum operating pressure.

O. T. Bloomer

Plastic Pipe

Wilson, G. M. LIGHTWEIGHT PLASTIC PIPE IS MEETING SPECIALIZED NEEDS. *World Oil*, **135**, 270-275 (1952) November.

The article illustrates some of the advantages of plastic pipe as used in oil field installations. Ease of transportation and laying, speed in connecting joints, inertness to rust and corrosion and its ability to withstand electrolysis are stressed. Tables of physical and chemical properties are included. R. A. Brown

Protective Coatings

Tator, K. HOW PROTECTIVE COATINGS FIGHT CORROSION. *Chem. Eng.*, **59**, 143-190 (1952) December.

This Chemical Engineering 15th Biennial Report on Materials of Construction deals in great detail with all types of organic protective coatings. Subdivisions include: proper selection and application of paints; classification according to service conditions, basic types, physical forms; formulations of basic types, procurement, performance and acceptance tests; tabular guide to chemical resistance; directory of trade names and producers; and a 14-page directory of materials, listing the manufacturer, description and form, and applications.

O. P. Brysch

Weld Inspection

Grant, W. C. NEW METHOD OF INSPECTING PIPE LINE WELDS SAVES MONEY AND PROMOTES SAFETY. *Gas Age*, **110**, 19-23 (1952) November 6.

Gamma-ray inspection of pipe-line welds is very simple and economical. Insufficient weld penetration, poor fusion, and gas pockets are very easily recognized in gamma-ray films.

D. C. Gami

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Jones, M. C. PETROLEUM ASH COMPONENTS: EFFECT ON REFRACTORIES. p. 20

Myler, W. M., Jr. STUDY GAS COMBUSTION CORROSION. p. 18

13. NEW BOOKS

Gas Treatment

Bolzinger, A. LA TRANSMISSION DE LA CHALEUR, L'ABSORPTION ET LEURS APPLICATIONS AU TRAITEMENT DU GAZ. (HEAT TRANSMISSION, ABSORPTION AND THEIR APPLICATION TO THE TREATMENT OF GAS). Journal des Usines a Gaz, 62 R. de Courcelles, Paris, 8 (1952), XII + 302 pages.

Technical men in the gas industry should find this modern chemical engineering treatment of heat transmission and absorption a useful reference and guide in design and operational problems. Theoretical explanations, examples, tables, graphs and nomograms are presented in profusion throughout the discussion of the specific operations. The first section of 66 pages deals with the theory of the gas laws, phase equilibria, fluid dynamics, heat transfer and diffusion. The second section, 162 pages in 4 chapters, discusses fundamental features involved in the design of types of coolers, condensers, scrubbers and extractors. Then particular processes as applied in the gas industry are treated in the third section of 46 pages. Removal of naphthalene, ammonia, tar, phenol, benzole are covered more completely here. Finally, five appendices of 24 pages present data on properties and constants, and a bibliographic list contains 35 references.

O. P. Brysch

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Chemical Engineering
Chemical Engineering Costs Quarterly
Chemical Engineering Progress
Chemical Processing
Chemical Reviews
Chemical Society (London) Journal
Chemical Week
Chemist
Chemistry
Chemistry and Industry
Coal Heat
Coke and Gas
Combustion
Compressed Air
Construction Methods and Equipment
Corrosion

Electronics
Endeavour
Engineers' Digest

Faraday Society. Transactions
Fuel
Fuel Abstracts
Fuel Economy
Fueloil and Oil Heat

Gas
Gas Age
Gas and Oil Power
Gas Heat
Gas Journal
Gas News (Chicago)
Gas Research Board Publications
Gas Times
Gas und Wasserfach
Gas World

Heating and Ventilating
Heating, Piping and Air Conditioning

Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Finishing
Industrial Gas (American)
Industrial Gas (British)
Industrial Heating
Institute of Fuel (British). Journal
Institute of Petroleum (British). Journal
Institute of Gas Technology Publications
Institution of Gas Engineers. Bulletins, Communications and Transactions
Instruments

Journal des Usines a Gaz
Journal of Applied Chemistry
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Education
Journal of Chemical Physics
Journal of Engineering Education
Journal of Metals
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical Chemistry
Journal of Research (National Bureau of Standards)
Journal of Scientific Instruments
Journal of Southern Research

LP-Gas

Materials and Methods
Mechanical Engineering
Mining Engineering

National Fire Protection Association Quarterly
National Gas Bulletin
National Petroleum News
Nucleonics

Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Oil, Paint and Drug Reporter
Optical Society of America. Journal

Paint and Varnish Production
Petroleum
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Physical Review
Physics Today
Pipe Line News
Power
Power Engineering
Public Utilities Fortnightly

Review of Scientific Instruments
Revista dei Combustibili
Revue generale du Gaz

Science
Southern Gas Association Progress
Southern Power and Industry
Spectrochemica Acta

Technical News Bulletin

U.S. Bureau of Mines. Bulletins, Information Circulars, Reports of Investigations and Technical Papers

World Oil